

REMARKS

[0001] In the Office Action, claims 1-27 are pending in the case. The Examiner rejected Claims 1-18 and 21-27 under 35 U.S.C. §103(a) in view of U.S. Patent No. 5,604,902 to Burkes et al. (hereinafter "Burkes"). The Examiner rejected Claims 19-20 under 35 U.S.C. §103(a) in view of U.S. Patent No. 6,282,605 to Moore (hereinafter "Moore"). In view of the following remarks, reconsideration and allowance of claims 1-27 is respectfully requested.

REJECTION OF CLAIMS 1-18, 19-20, AND 21-27 UNDER 35 U.S.C. §103(a)

[0002] The Examiner rejected Claims 1-18 and 21-27 under 35 U.S.C. §103(a) in view of Burkes and Claims 19-20 in view of Burkes and Moore. Applicant respectfully traverses these rejections.

[0003] It is well settled that the PTO has the burden to establish a *prima facie* case of obviousness. *In re Glaug*, 2002 U.S. App. Lexis 4246, *4 (Fed. Cir. March 15, 2002); MPEP §2142. "To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art." MPEP §2143.03 (emphasis added). The Federal Circuit has held that "the 'subject matter' that must have been obvious to deny patentability under §103 is the entirety of the claimed invention," *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1576 (Fed. Cir. 1987). Furthermore, even if all the claim limitations are taught or suggested, there must be some suggestion or motivation to combine reference teachings. See MPEP §2142. Applicant respectfully asserts that a *prima facie* case of obviousness has not been made because not all the elements recited in the claims are taught or suggested by the prior art and there is no teaching or suggestion in the art to produce the claimed invention.

[0004] Claim 1 recites, in pertinent part, "determining a fitness value for at least some of the segments by determining the product of the amount of free space in the segment and the expected time the free space will last..." The term "fitness value" is a new term defined by the Applicant both in the specification as well as in Claim 1. See Specification page 14, lines 19 – 26. Specifically, the fitness value comprises multiplying the amount of free space in a segment by the expected time the free space will last. The features making up the fitness value are

explored below. Applicant, however, respectfully submits that Burkes and Moore fail to teach or suggest any concepts which correspond to a fitness value in view of the claim language or the specification.

[0005] The legal and PTO framework for determining claim term meaning is clear. First, “[c]laims are not to be read in a vacuum, and limitations therein are to be interpreted in light of the specification in giving them their ‘broadest reasonable interpretation’.” *In re Marosi*, 710 F.2d 799, 802 218 USPQ 289 292 (Fed. Cir. 1983). Second, “[t]he broadest reasonable interpretation of the claims must also be consistent with the interpretation that those skilled in the art would reach. *In re Cortright*, 165 F.3d 1353, 1359, 49 USPQ2d 1464, 1468 (Fed. Cir. 1999). MPEP §2111. And third, “[t]he words of a claim must be given their “plain meaning” unless they are defined in the specification. “[P]lain meaning” refers to the meaning given to the term by those of ordinary skill in the art” MPEP §2111.01. Therefore, the claim term fitness value is to be interpreted in light of the specification and consistent with an interpretation those of skill in the art would give the term. Furthermore, where a term is defined in the specification that definition should control the interpretation.

[0006] In Claim 1, fitness value is a characteristic of a segment. Fitness (which is represented by the value) is defined in various places in the specification. On page 29, line 1, fitness is defined as a “function used to determine the segment fitness for selection for free space collection.” In particular, the fitness value identifies a degree of suitability of one segment for selection for free space collection, garbage collection, with respect to another segment. See Specification page 32, lines 5 – 19. The fitness value comes from a fitness function which meets certain conditions defining fitness for full segments (those that have data writes and no free space), empty segments (those having all free space), and partially filled segments. See *Id.*

[0007] The specification provides a description of how segments are recycled in a data storage subsystem such as an LSA storage architecture. See Specification page 26, line 24 – page 27, line 19; Figure 2. The fitness value provides a heuristic for determining the desirability of selecting one segment for free space collection over another. The higher the fitness value the better a segment is for free space collection. See Specification page 28, lines 19-20.

[0008] This characteristic depends in part on the amount of free space currently in a segment. Free space is space that was previously in use. But, a data request has modified data in that space such that the space is now available for use to store new data. The process of creating free space is explained in the specification on page 7, lines 5 -16. The more free space in a segment, the more free space (benefit) is gained by selecting the segment and the faster the segment can be processed for free space collection. Non-free space has to be shuffled which increases the cost of selecting the segment.

[0009] In addition, the fitness value (and associated fitness function) seeks to select segments that will keep free space available for the longest period of time. This is a factor because the segments being considered for selection for free space collection are concurrently being written to by the storage subsystem. See Specification page 28, lines 15-16. Therefore, depending on how fast free space is being used up (utilization rate), a segment may or may not be an optimal choice for free space collection. If the utilization rate is high, the overhead in selecting such a segment may outweigh the advantages of comparing the free space. The specification then goes on to describe various ways to estimate or calculate the expected time free space contributed by a segment will last. See Specification page 29, line 5 – page 33, line 10.

[0010] Applicant respectfully submits that the claim term “fitness value” has no “plain” meaning in the art other than what can be derived from the term ‘fitness.’ Consequently, the specification takes great lengths to define the term and its associated fitness function. The specific definition and the conditions for a fitness function outlined in the specification define the term with sufficient clarity that those of skill in the art are apprised of the metes and bounds set forth in Claim 1. See specification on page 28, lines 19-20, page 32, line 5 – page 33, line 11.

[0011] The Examiner acknowledges that Burkes fails to specifically teach “determining the product of the amount of free space in the segment and the expected time the free space will last” as recited in Claim 1. See Office Action page 2. The Examiner then makes an unsupported assertion that such a step is obvious in view of Burkes. The Examiner has failed to identify any teaching in Burkes that relates to the subject matter above which defines a fitness value. “The examiner cannot sit mum, leaving the applicant to shoot arrows into the dark hoping to somehow

hit a secret objection harbored by the examiner. [The examiner] must state clearly and specifically any objections... and give the applicant fair opportunity to meet those objections with evidence and argument." *In re Oetiker*, 24 U.S.P.Q.2d 1443, 1447 (Fed. Cir 1992)(Plager, J. concurring).

[0012] Instead of identifying a teaching in Burkes that renders the claimed subject matter obvious, the Examiner quotes a potential benefit in Burkes of organizing segment selection based on a frequency distribution table (The same benefit is recognized and described in Claims 8-12 and in the specification on page 34). *Burkes* col. 8, lines 49-58.

[0013] Burkes teaches selection of two memory structures for use in free space collection. The difference is that in Burkes neither of the memory structures is completely free of space. *Burkes* col. 3, lines 53-57. (source fragmented area to target fragmented area). The claimed invention relates specifically to selection of the source fragmented area. See specification page 8, lines 5-7. Burkes describes the selection process in column 7 lines 13 – 26. This selection process is known as a cost/benefit selection process. *Burkes* col. 7, lines 19-23. Selection candidates are characterized as emptier or fuller depending on the degree of fragmentation. *Burkes* col. 7, lines 15 – 20.

[0014] Applicant asserts that a degree of fragmentation is very different from a fitness value. The degree of fragmentation is the number of full data locations divided by the total number of data locations. In contrast, a fitness value is the desirability of selecting one segment for free space collection over another. As explained above, the fitness value factors in free space available as well as the expected time the free space will last. A degree of fragmentation involves free space but has no relationship to the expected time the free space will last. Therefore, Burkes fails to teach or suggest a fitness value or fitness function in which is the "product of the amount of free space in the segment and the expected time the free space will last." See Claim 1.

[0015] Claim 3 recites that the fitness value is segment age times free space divided by used space. Applicant finds nothing in Burkes or Moore to suggest such a determination of fitness value or desirability for selecting a fragmented area. Claim 2 also recites that the expected time the free space will last is estimated by the rate of use of still-in-use data in the

segment. See Specification page 28, lines 11-16. Applicant finds nothing in Burkes or Moore to teach or suggest these elements. Furthermore, as explained above, the Examiner has provided no indication as to what may be considered to teach these elements. Therefore, Applicant asserts that Claims 2 and 3 are nonobvious.

[0016] Applicant asserts that the Examiner has failed to make a *prima facie* case of obviousness because no evidence is provided to indicate that Burkes teaches or suggests the fitness value defined as the "product of the amount of free space in the segment and the expected time the free space will last." The fitness value is to be interpreted in light of the specification. As indicated above, "fitness value" is defined with sufficient specificity that the Applicant is acting as his own lexicographer. Moore fails to cure the deficiencies of Burkes. Therefore, Applicant respectfully asserts that Burkes and Moore fail to teach all the elements of Claims 1, 2, and 3. Therefore, Claims 1, 2, and 3 are allowable.

[0017] Finally, neither the Burkes nor Moore reference teach or suggest combining concepts found in each or the desirability of such a combination. As "[t]he teaching or suggestion to make the claimed combination ... must be found in the prior art, not in applicant's disclosure," MPEP 2143, citing *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991), Applicant submits that Burkes and Moore fail to provide the requisite motivation to combine to make a *prima facie* case of obviousness.

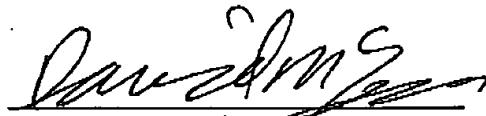
[0018] Moore teaches use of a B-tree directory structure in mapping a physical memory address to a logical memory address. Moore is cited for the proposition that Moore teaches the grouping of segments, each group having a range of amount of used data as recited in Claim 19. See Office Action page 6. Applicant respectfully asserts that even if this is true, there is no teaching or motivation in Moore to combine it with Burkes. Alternatively, there is no teaching in Burkes to combine its teachings with those in Moore.

[0019] Furthermore, if Burkes were combined with Moore, the combination would still lack the nonobvious teaching of "determining a fitness value...by determining the product of the amount of free space in the segment and the expected time the free space will last." Fitness value is a new term defined by the Applicant that is very different from any of the features taught in Burkes or Moore as explained above.

[0020] For the reasons stated above, Applicants respectfully submit that independent Claim 1 is patentably distinct from the cited reference. Independent Claims 14 and 27 include substantially the same subject matter and features are independent Claim 1. Therefore, Claims 14 and 27 are allowable for at least the same reasons as Claim 1. In addition, Claims 2-13 and 15-26 depend directly or indirectly from the independent claims. Accordingly, Applicants also respectfully submit that these dependent claims are likewise allowable for at least the same reasons.

[0021] In view of the foregoing, Applicant submits that the application is in condition for immediate allowance. In the event any questions remain, the Examiner is respectfully requested to initiate a telephone conference with the undersigned.

Respectfully submitted,



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